~~Description~~

Method for Receiving Radio Signals of Different Standards

The invention concerns a method for receiving different types of radio standards ~~according to the pre-characterizing portion of Patent Claim 1.~~

Description of the Related Art

Signal transmission in the field of mobile communications (GSM, DCS 1800) and satellite navigation (GPS) involves different radio standards (modulation types, signal band widths), which must be processed with the aid of receivers. Importance is placed in particular upon a combined processing of the signals. Until now, solutions have been limited to a separate processing with respective separate receiver structures, which must be combined with the aid of a computer. In this respect, it would be desirable to have a receiver, which can accommodate the various radio standards as so called multi-mode receiver.

The hitherto employed classical architecture in heterodyne receivers or digital receivers have dynamic compensation problems in the case of high loads or demands.

SUMMARY OF THE INVENTION

The invention is based on the task of providing a process, in which the processing efficiency of the radio signals is increased.

~~The invention is set forth in the characterizing section of Patent Claim 1. The subsequent claims recite advantageous embodiments and further developments of the invention.~~

The invention includes a process, in which the addition of a CDMA encoded signal and a hitherto conventional modulated signal, preferably at intermediate frequencies, leads to a simplification of the demands on the analog-to-digital converter and the intermediate frequency editing since before decorrelation the CDMA signal can be lower than the background noise and is raised from the background noise (N_o) only by subsequent decorrelation.

A particular advantage of the invention is comprised therein that, in comparison to hitherto conventional systems, less hardware components are required. Thereby, A/D converters to mixers and filters can be saved.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be described in greater detail on the basis of illustrative embodiments shown in schematic manner in the figures. There is shown:

Fig. 1 Levels of different signals in the example of GPS and DAB

Fig. 2 Addition subsequent to the first mixing step

Fig. 3 Addition prior to the first mixing step

Fig. 4 Simplification by special HF-filter structures

Fig. 5 Transmission characteristics of the special HF-filters

DETAILED DESCRIPTION OF THE INVENTION

In a first illustrative embodiment according to Fig. 1, the level of the different signals, for example GPS and DAB, is shown. The addition of a CDMA-coded signal and a conventional modulated signal are carried out in intermediate frequencies. Thereby, the CDMA-signal lies below the background noise before decorrelation and is only lifted out of the noise N_0 by a later decorrelation.

In a second illustrative embodiment according to Fig. 2, high frequency signals of two separate mixers LO1 and LO2 are mixed down to the same intermediate frequency. The amplification factors G1 and G2 of the two branches are so selected, that the CDMA-signal for example a GPS-signal does not disturb the other signal for example a OFDM-coded DAB-signal. Not until the digital signal processing following the analog-digital-conversion A/D are both signal parts again separated and the GPS-signal lifted out of the noise through decorrelation. Thereby, the digitalization can occur directly in the base band or directly in the intermediate frequencies.

In a third illustrative embodiment according to Fig. 3, there is shown the alternative possibility of adding both signals already prior to the mixer and to subsequently mix down to the intermediate frequency with a mixer. As local oscillator, two

narrow band oscillators are employed in accordance with the sum of the output. In this embodiment, however, the requirements placed upon the input filter are somewhat raised.

In a fourth embodiment according to Fig. 5, there is also the possibility of employing a special input filter, which undertakes the level adaptation or interfacing a_1 and a_2 and the band selection f_1 and f_2 in integrated manner. Thereby, the complexity prior to the mixer is again reduced in accordance with Fig. 4. The attenuation co-efficient in the passbands a_1 and a_2 are so dimensioned that the CDMA-signal becomes lower than the noise level of the OFDM-signal.